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U.S. ARMY TEST AND EVALUATION COMMAND
TEST OPERATIONS PROCEDURE

AMSTE-RP-702-102

*Test Operations Procedure 3-2-518

16 June 1988

AD No.

SUBCALIBER GUNS

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1. SCOPE. This TOP provides procedures for determining the suitability of subcaliber guns for firing when mounted in/on their ^mparent ^mlarger caliber weapons. (see fig. 1).

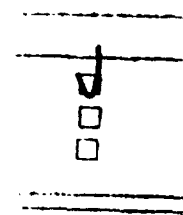
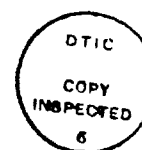
A subcaliber gun is usually much smaller caliber than the parent weapon, and is used for the firing phase of troop training programs on the major caliber weapon. Use of the subcaliber gun and ammunition conserves the costlier ammunition and saves wear and tear on the larger weapon, thus permitting more extensive training. Personnel involved in testing subcaliber guns should be aware that these guns are real weapons capable of killing/maiming troops in training. Subcaliber devices may be simple or as complicated as the main armament they simulate.

Externally mounted subcaliber guns use the traversing, elevating, and fire control mechanisms of the larger weapon. Tests are conducted to determine the parallelism of the bore axes of both weapons and their ability to remain aligned. When gun crews are being trained, it is desirable that the projectile trajectories and times of flight of both major and subcaliber weapons be related, as it is reasonable to assume that some of the training will be performed at night, and tracer ammunition may be used to familiarize the crews with those features.

Internally mounted subcaliber guns use the breech mechanism, firing mechanism, and other components of the major caliber weapon. Weapon bores must be concentric, and back blast upon firing should be minimal. The firing mechanism of the larger weapon, if used, must be properly aligned to detonate the primer of the small round by percussion or electrical means.

*This TOP supersedes MTP 3-2-518 dated 14 May 1968.

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Distribution/	
Availability Codes	
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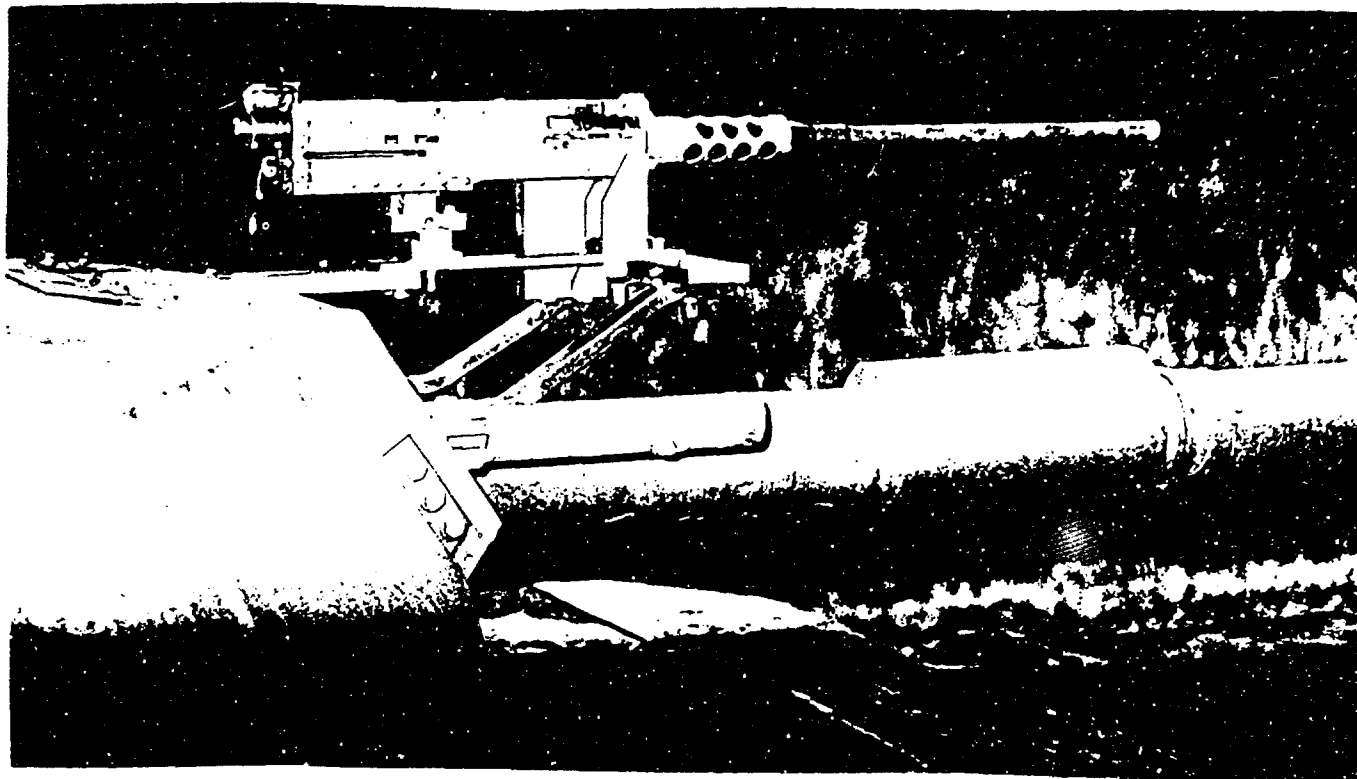


Figure 1. Externally mounted subcaliber gun, cal .50 M2HB machine gun coaxially mounted on main gun of M1 tank.

2. FACILITIES AND INSTRUMENTATION.

2.1 Facilities.

ITEM

REQUIREMENT

Mount assembly

For externally mounted gun

Parent weapon

2.2 Instrumentation.

DEVICE FOR MEASURING:

PERMISSIBLE ERROR OF MEASUREMENT

Torque

20Nm to 80 Nm (15 ft-lb to
60 ft-lb)

3. REQUIRED TEST CONDITIONS. Conduct initial inspections of subcaliber gun mounted in/or its parent weapon in accordance with TOP 3-2-800.^{1*}

3.1 Pre-Firing Tests.

a. Using suitable gauges, check the parallelism of the subcaliber gun's bore axis with that of the major caliber weapon.

*Superscript numbers correspond to reference numbers in Appendix A.

b. Examine the completely assembled system for interference with the normal operation of the parent weapon.

c. Verify that the firing mechanism of the larger weapon is properly aligned to detonate the primer of the small round by percussion or electrical means.

d. Evaluate ease of loading/unloading the subcaliber gun.

3.2 Data Required. Record the following:

a. The parallax of the subcaliber gun with the bore of the parent weapon.

b. The location and type of interference with weapon system operation, if applicable.

c. Any misalignment of the major weapon system firing mechanism with the subcaliber weapon.

d. Any difficulties encountered with loading/unloading the subcaliber round.

4. TEST PROCEDURES. With the subcaliber gun mounted in accordance with paragraph 3.1, conduct applicable tests as specified in the test directive. Typical tests are described on the following pages.

4.1 Safety Test. Conduct this test according to procedures given in TOP 3-2-829². This test is for the purpose of evaluating the safe service life of cannon tubes (37 mm and above) and breech mechanisms by number of equivalent full charge rounds that can be fired before excessive metal fatigue or tube wear occurs.

4.2 Boresight Retention. Conduct this test according to the procedures given in ITOP 3-2-604³. This test provides a method of evaluating boresight retention capability of gun control systems mounted in combat vehicles.

4.3 Human Factors Evaluation. Since subcaliber guns are used for troop training programs, it is essential that the soldier-item relationship be assessed. Conduct this test in accordance with TOP 1-2-610⁴, MIL-STD 1474B(MI)⁵, and TOP 1-2-608.⁶

4.4 Reliability, Availability, Maintainability, and Durability. Conduct this test according to TOP 1-2-502⁷ which gives procedures for durability testing and TECOM Supplement 1 to AMC 700-15⁸ which covers logistic supportability.

4.5 Accuracy-Dispersion. Conduct this test according to ITOP 4-2-829⁹ which provides a method of evaluating accuracy and dispersion characteristics.

4.6 Cant Firing. This test is conducted to determine performance characteristics of a subcaliber gun at various cant angles.

4.6.1 Method.

a. Place the gun in a 15° cant right position.

- b. Fire 50 rounds from each mount at maximum and minimum gun elevations.
- c. Repeat firings with gun placed in 15° cant left position.

4.6.2 Data Required. Record the following:

- a. Any stoppages or failures.
- b. Any interference with gun performance due to cant.
- c. Safety or human factors problems noted during firings.

5. DATA REQUIRED. Record data as specified in applicable TOP/ITOP.

6. PRESENTATION OF DATA. Evaluate data collected to determine the relationship between the firing table of major and minor caliber weapons.

Recommended changes of this publication should be forwarded to Commander, U.S. Army Test and Evaluation Command, ATTN: AMSTE-TC-M, Aberdeen Proving Ground, MD 21005-5055. Technical information can be obtained from the preparing activity: Commander, U.S. Army Combat Systems Test Activity ATTN: STECS-AD, Aberdeen Proving Ground, MD 21001-5059. Additional copies are available from the Defense Technical Information Center, Cameron Station, Alexandria, VA 22304-6145. This document is identified by the accession number (AD No.) printed on the first page.

APPENDIX A

REQUIRED REFERENCES

1. ITOP 3-2-802, Measurement & Inspection of Gun Tubes (Cannon), May 5, 1988.
2. ITOP 3-2-829, Cannon Safety Tests, 13 December 1984.
3. ITOP 3-2-604, Boresight Retention, 14 October 1983.
4. TOP 1-2-610, Human Factors Engineering (Part I - Procedures, Part II - Hedge), 30 November 1983.
5. MIL-STD-1474B(MI), Noise Limits for Army Materiel, 18 June 1979; Notice 1, 10 October 1980; Notice 2, 20 April 1984.
6. TOP 1-2-608, Sound Level Measurements, 17 July 1981.
7. TOP 1-2-502, Durability, 19 December 1984.
8. TECOM Suppl 1 to AMC-R 700-15, Integrated Logistics Support, 20 June 1980.
9. ITOP 4-2-829, Vertical Target Accuracy and Dispersion, 13 December 1985.